In the Specification:

Please add a "Statement of Related Applications" section before the "Background of the Invention" section as follows:

STATEMENT OF RELATED APPLICATIONS

This application is a divisional of U.S. Application No. 09/569,185, filed May 17, 2000, currently pending.

Please replace the following paragraphs with the following amended paragraphs ~~as follows~~:

Page 1, beginning at line 7:

The present invention relates to a non-aqueous electrolyte capable of providing a lithium secondary battery having superior battery cycle ~~characteristic~~ characteristics and battery characteristics such as electrical capacity, storage ~~characteristic~~ characteristics, and also relates to a lithium secondary battery using the same.

Page 1, beginning at line 28:

However, a secondary battery having more superior battery cycle characteristic and battery characteristics such as electrical capacity has been desired. A lithium secondary battery using a highly crystallized carbonaceous material such as natural graphite or artificial graphite as the anode sometimes suffer from ~~breakdown~~ breakdowns of the electrolyte at the anode and an increase in the irreversible capacity or in some cases peeling of the ~~carboneous~~ carbonaceous material ~~occur~~ occurs. The increase in the irreversible capacity or the peeling of the carbonaceous material occurs due to the decomposition of the solvent in the electrolyte during the charge thereof and is due to the electrochemical reduction of the solvent at the interface between the carbonaceous material and the electrolyte. In particular, PC having a low melting point and high dielectric constant has a high electroconductivity even at a low temperature. Nevertheless, when a graphite anode is used, there are problems that the PC cannot be used for the lithium secondary battery due to the decomposition thereof. Further, BC partially decomposes during the repeated charge and discharge thereof so that the battery performance is

decreased. Therefore, the battery cycle ~~characteristic~~ characteristics and the battery characteristics such as electrical capacity are not necessarily satisfied.

Page 2, beginning at line 16:

On the other hand, as the salt dissolved in the non-aqueous solvent, a lithium salt such as $LiClO_4$, $LiPF_6$ or $LiBF_4$ is used. A non-aqueous electrolyte containing such a non-aqueous solvent and the $LiPF_6$ dissolved therein is known to ~~be~~ have high conductivity and high in the oxidation decomposition voltage of the $LiPF_6$, and therefore, is stable at high voltage.

Page 2, beginning at line 23:

However, $LiPF_6$ is inferior in heat stability, and therefore, there is the problem that the lithium salt is decomposed at a high temperature environment of 60°C or more and the battery ~~performances~~ performance such as the cycle life under a high temperature environment ~~are~~ is tremendously decreased. On the other hand, $LiBF_4$, which is superior to $LiPF_6$ in the heat stability, may be mentioned, but the ion conductivity that is inferior to that of $LiPF_6$. Thus, there is the problem that battery performance such as the cycle life is decreased under an ordinary temperature environment. Therefore, a cyclic ester such as γ-butyrolactone (GBL) is used due to the relatively high conductivity thereof. However, when GBL is used for a lithium secondary battery using a highly crystallized carbonaceous material such as natural graphite or artificial graphite as an anode, the GBL will electrochemically be decomposed at the graphite anode interface at the time of charging, and therefore, the battery performance will be decreased along with repeated use of charging and discharging. Thus, at the present time, the battery cycle ~~characteristic~~ characteristics and battery characteristics are not necessarily satisfactory.

Page 3, beginning at line 9:

The objects of the present invention are to solve the above-mentioned problems relating to an electrolyte for a lithium secondary battery and provide a non-aqueous electrolyte for a lithium secondary battery having superior the battery cycle ~~characteristic~~ characteristics and battery characteristics such as electrical capacity and a lithium secondary battery using the same.

Page 4, beginning at line 24:

In the compound contained in the electrolyte comprised of a non-aqueous solvent and an electrolyte salt dissolved therein, the R in the vinyl sulfone derivative having the formula (I) is a C_1 to C_{12} alkyl group, preferably a C_1 to C_4 alkyl group such as a methyl group, ethyl group, or propyl group. The alkyl group may be a branched alkyl group such as an isopropyl group or isobutyl group. Further, it may be a C_2 to C_{13} alkenyl group, preferably a C_2 to C_6 alkenyl group, such as a vinyl group or an allyl group or a C_3 to C_6 cycloalkyl group such as a cyclopropyl group or a cyclohexyl group.

Page 5, beginning at line 4:

In the case of adding the vinyl sulfone derivative, if the content of the vinyl sulfone derivative (I) is too large, the conductivity of the electrolyte ~~etc. are~~ is varied arid the battery performance is decreased in some cases. Further, if the content is too small, a sufficient coating is not formed and the expected battery performance cannot be obtained. Therefore, the content is preferably in the range of 0.01 to 20% by weight, particularly 0.1 to 10% by weight, based upon the weight of the electrolyte.

Page 6, beginning at line 22:

By including a cyclic carbonate and cyclic ester and further optionally a linear carbonate as the non-aqueous solvent in the present invention, it is possible to improve the wettability of the separator, reduce the variation at the time of production of the batteries, and raise the production efficiency and it is possible to improve the cycle ~~characteristic~~ characteristics. As the linear carbonate, such as dimethyl carbonate (DNC), methylethyl carbonate (NEC), methylpropyl carbonate (MPC), butylmethyl carbonate (BMC), and diethyl carbonate (DEC) and a branched carbonate such as methylisopropyl carbonate (MIPC), isobutylmethyl carbonate (IBMC), sec-butylmethyl carbonate (SBMC), and tert-butylmethyl carbonate (TBMC) may be mentioned. These linear carbonates may be used alone or may be used in any combination thereof.

Page 7, beginning at line 29:

As the cathode active material, a complex metal oxide of at least one metal selected from the group consisting of cobalt, manganese, nickel, chrome, iron, and vanadium with lithium is used. As such, a complex metal oxide, for example, $LiCoO_2$, $LiMn_2O_4$, $LiNiO_2$, etc. may be mentioned.

Page 7, beginning at line 35:

The cathode is prepared by, for example, mixing the cathode active material with a conductive agent such as acetylene black or carbon black and a binder such as polytetrafluoroethylene (PTFE) and polyvinylidene fluoride (PVDF) and a solvent to make a cathode paste, then coating the cathode paste on a collector such as aluminum foil or a stainless steel foil or lath, drying, compression molding, then heat treating at a temperature of ~~at~~ 50 to 250°C for about 2 hours in vacuum.

Page 8, beginning at line 35:

Preparation of Non-Aqueous Electrolyte

A non-aqueous solvent of PC:DMC (volume ratio) = 1:2 was prepared, and $LiPF_6$ was dissolved therein to a concentration of 1M to prepare the electrolyte. Thereafter divinyl sulfone (i.e., R=a vinyl group in the formula (I)) was added to 20% by weight, based upon the electrolyte as the vinyl sulfone derivative (i.e., additive).

Page 19, beginning at line 9:

According to the present invention, it is possible to provide a lithium secondary battery having superior battery cycle ~~characteristic~~ characteristics and battery characteristics such as electrical capacity, storage characteristic.